

INTRODUCTION TO PROGRAMMING

Ryan Collins

GREETINGS

ABOUT ME

I am a software engineer from Toronto, Canada specializing in building (and designing) awesome digital experiences for the web.

I love to work with small businesses and marginalized communities to bring their ideas to life.

I have also been teaching myself cybersecurity for over 12 years, and I provide cybersecurity consulting services to help organizations manage and protect against cyber attacks.

I also have an intense interest in cryptography, blockchain development, IPFS and decentralized applications, and in my free time I love to play online CTF's

IN THIS COURSE ..

YOU WILL LEARN THE FUNDAMENTALS OF HTML, CSS & JAVASCRIPT



FOR THIS COURSE

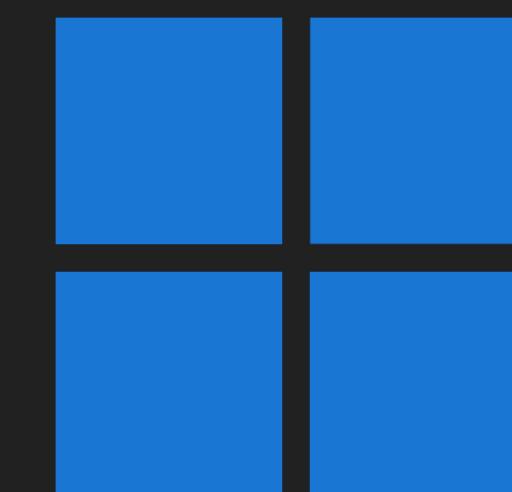
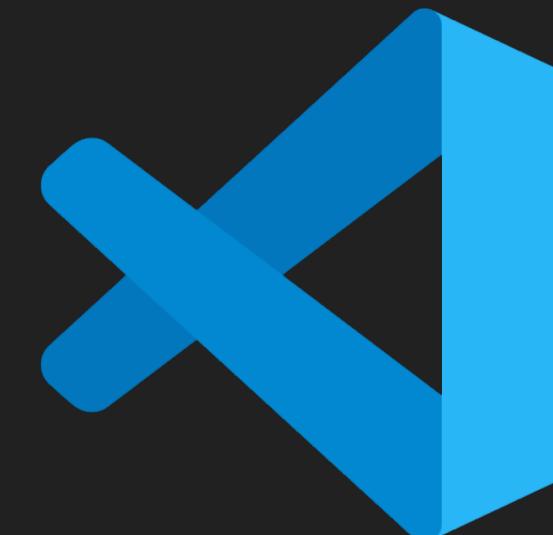
YOU WILL NEED

A computer or mobile device, a text editor or IDE (Integrated development environment), and an internet connection.

If you don't have these available to you, we have the following resources available to us.

[CodeSandbox](#) , or

[Replit](#)



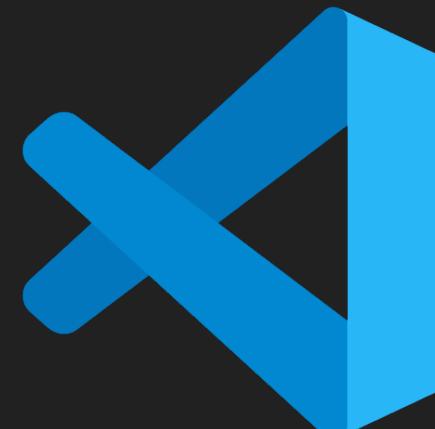
RESOURCES

If you have a laptop or desktop computer available, you can use Visual Studio Code as your text editor.

If you do not have access to a computer, or if you are using a mobile device like an iPad, you can use CodeSandbox.

If you have a laptop and feel comfortable using an IDE, CodeSandbox or Replit is *not* required.

We will also be using Google Chrome as our main browser, and GitHub throughout the course.

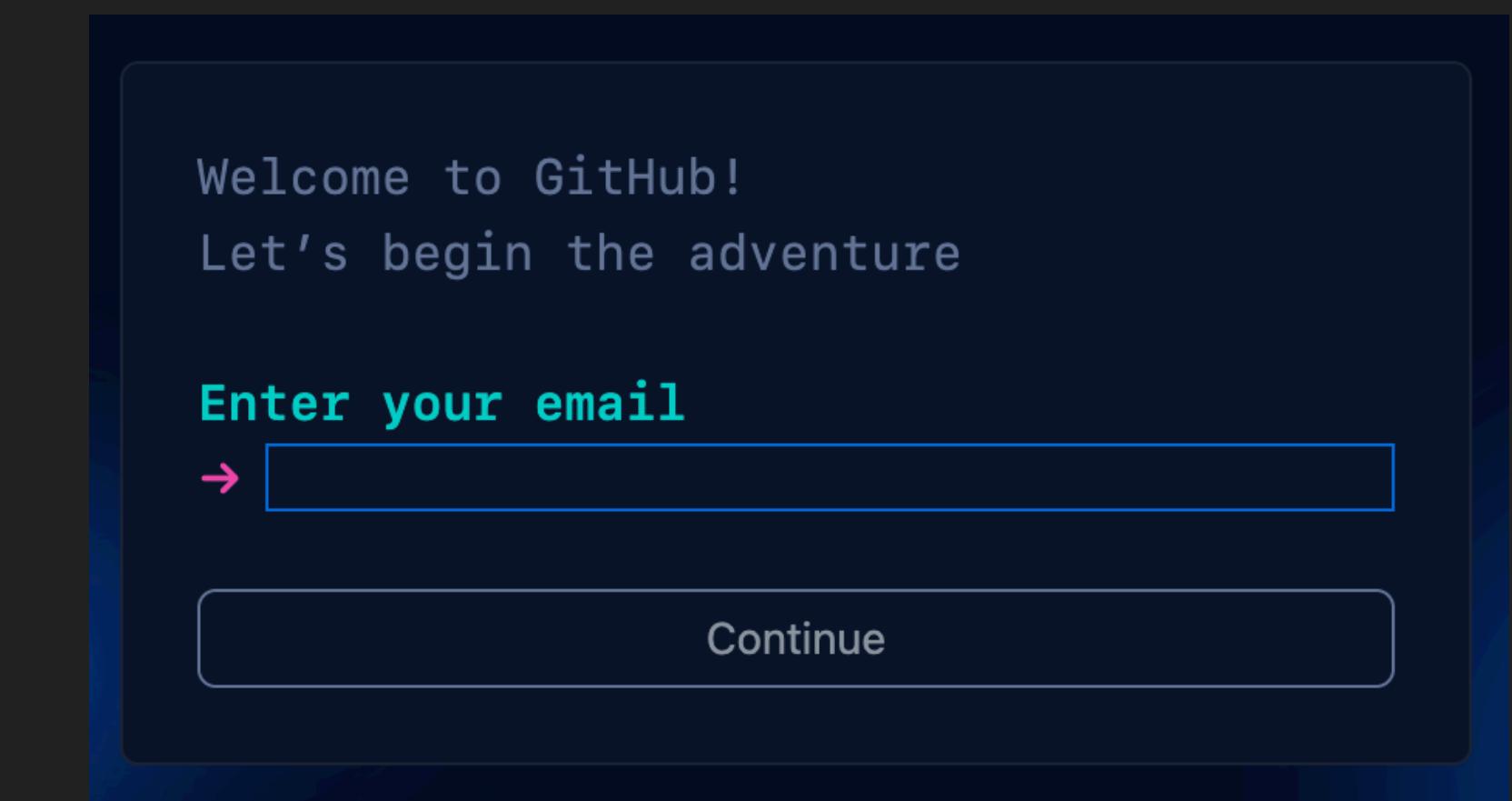
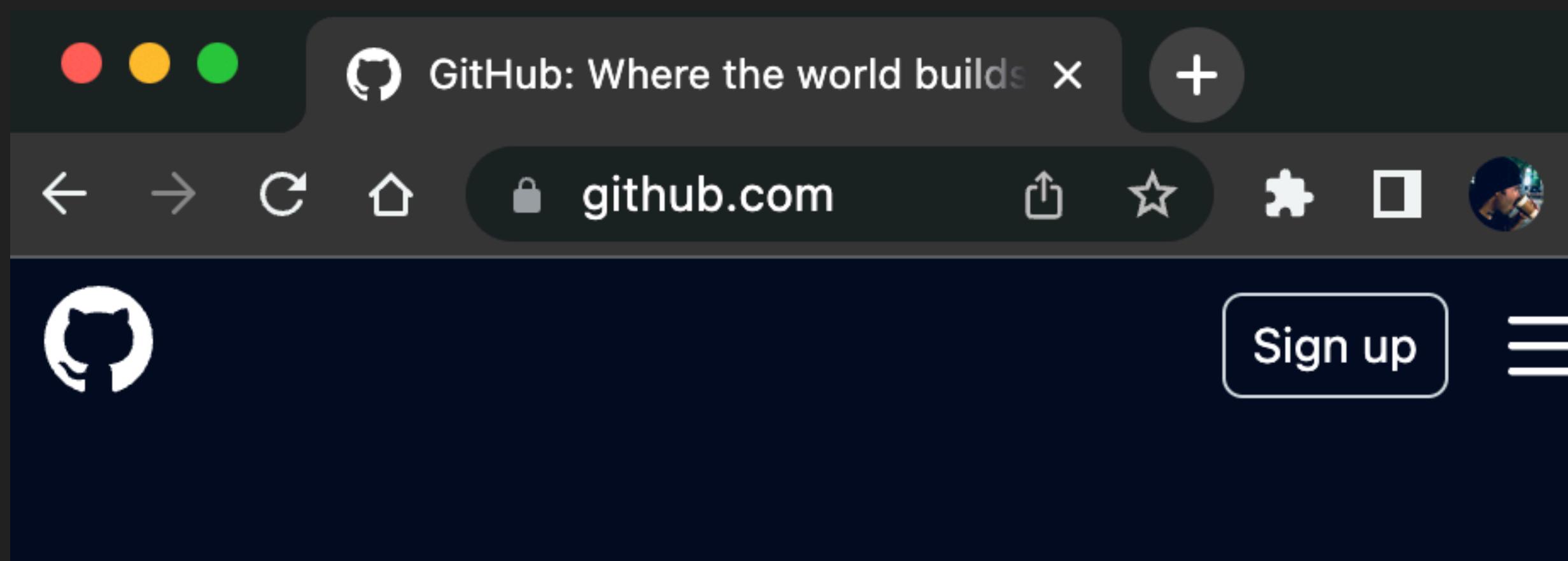


GITHUB

We will be using GitHub in this course to distribute content, alongside Slack and Google Drive.

If you don't already have a GitHub account for your repositories, now is a great time to set one up.

GitHub is 100% free, full of useful functionalities that you can use in your projects. Sign up is easy, just navigate in your browser to <https://github.com> and click the sign up button.



CODESandbox

A sandbox needs no setup - use a template to kickstart new projects, or start from a GitHub repo and begin coding in seconds

You can use [CodeSandbox](#) online in the browser or,

[CodeSandbox](#) for iOS is also available in the app store, is 100% free and even works on iPhones.

The image shows a laptop and a smartphone side-by-side. The laptop screen displays the CodeSandbox web interface, showing a GitHub repository named 'projects-release-demo'. The repository has 7 commits behind main. The code editor shows snippets of JavaScript and TypeScript code for 'app.js', 'index.js', and 'renderElement.ts'. The smartphone screen shows the CodeSandbox mobile application, which has a similar layout with code snippets and navigation elements. Both devices are connected to a keyboard.

CodeSandbox for iOS

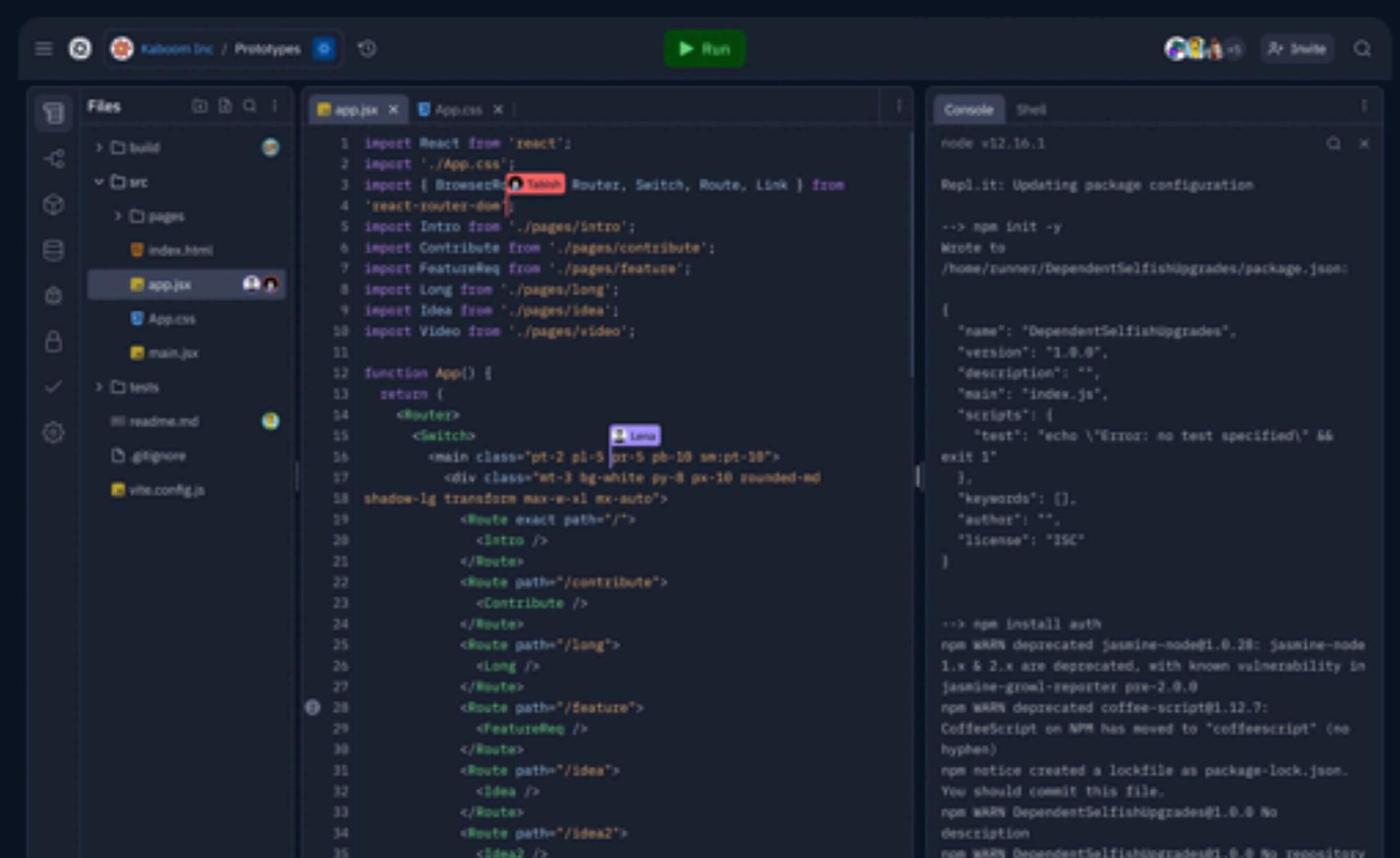
Anywhere, anytime.

Experience the future of web development and build projects with the first cloud IDE for iOS.

REPLIT

A free, collaborative, in-browser IDE to code in 50+ languages — without spending a second on setup.

You can use replit online right in the browser to [start coding](#)



The screenshot shows the Replit IDE interface. On the left is a file tree with files like `index.html`, `app.jsx`, `App.css`, `main.jsx`, `readme.md`, `.gitignore`, and `vite.config.js`. The main area displays React code for a navigation component. The right side features a terminal window showing npm package configuration and installation logs.

Instant IDE

Code right in your browser.

Collaborative, 0 setup, and Embeddable. Replit is the best tool for quickly starting, sharing, and developing projects in any programming language, right from your browser.

[Learn more about the IDE >_](#)

REMINDER!

For this course, you do not need all of the options suggested,

Just choose the best one for your situation, that you are the most comfortable with.



GETTING HELP

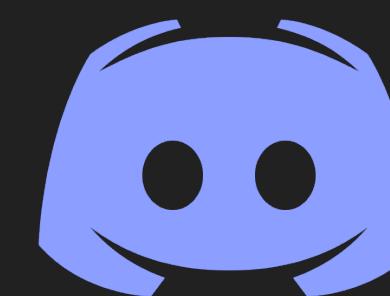
HOW TO GET HELP?

I always teach independence right from the very beginning, your best first option is Google, or any search engine. Chances are someone has had the same question answered.

If that doesn't work out, you can always ask your instructor, I'm here for you.

You can ask over Slack, in the public channel, or privately.

Finally, don't be afraid to ask for help if you get stuck, or you don't understand something 100%, that's perfectly ok.



Q&A

We are all at different levels, and that's 100% ok.

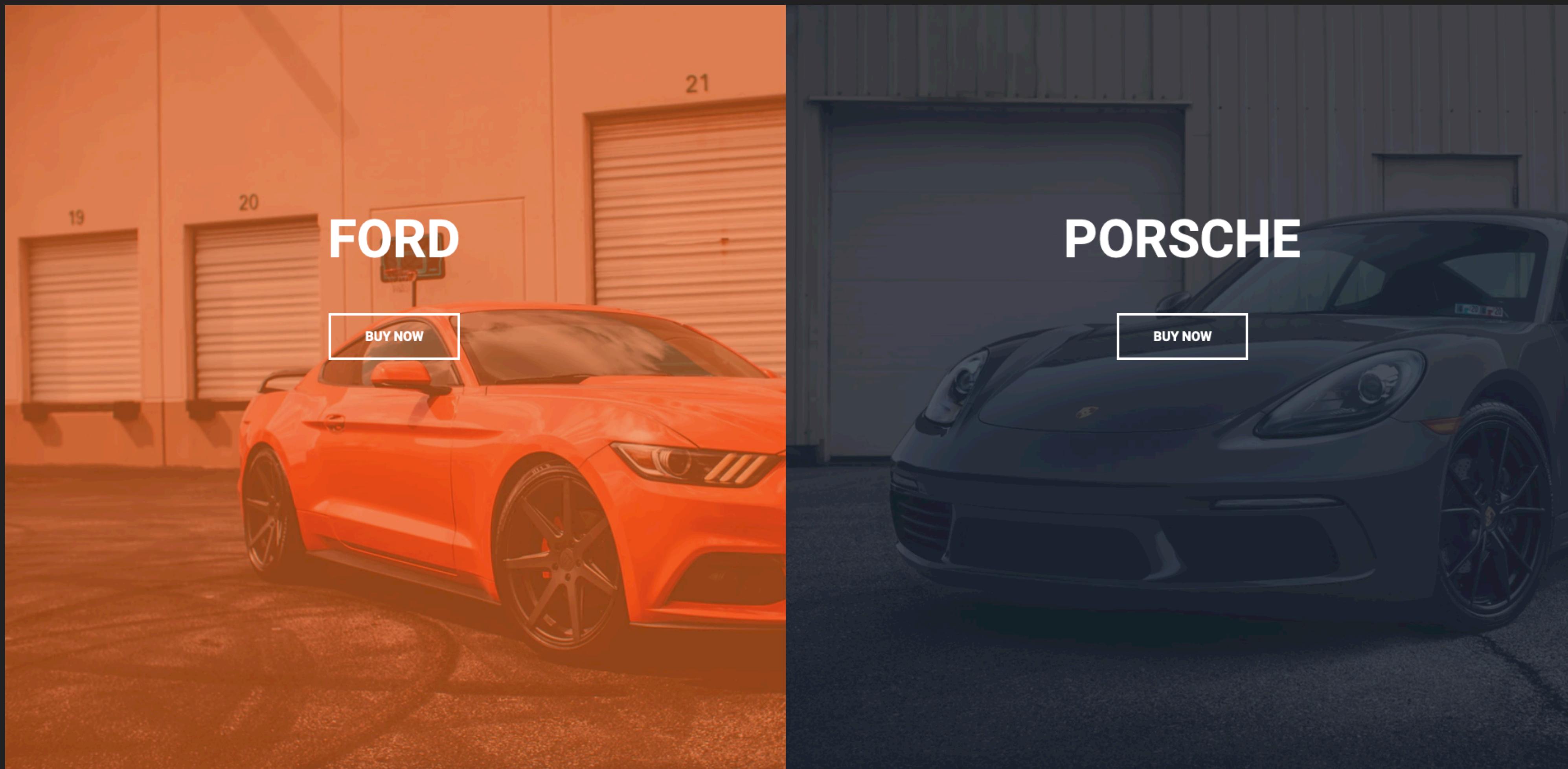
To be fair to our fellow students, let's try to keep all advanced and technical questions to the Q&A period, following the lecture.

We finish each lecture with a 15-20 min Q&A period.



OUR GOAL

By the end of this course, you should learn enough HTML, CSS and JavaScript basics, to have a fully functioning website.



LET'S GET STARTED

**WEB DEVELOPMENT
IS THE BEST JOB IN THE WORLD**

5 BILLION DAUS



THE INTERNET

YOU HAVE TO LEARN SOME STUFF FIRST

WHAT IS THE INTERNET?

HISTORY OF THE INTERNET

- In 1962, MIT computer scientist J.C.R Licklider comes up with the idea
- In 1973, Robert Kahn and Vinton Cerf develop TCP/IP
- In 1982, The first commercial network is connected to ARPANET
- In 1990, Tim Berners-Lee at CERN develop hypertext markup language
- In 1995, Microsoft launches Windows 95, Amazon, Yahoo and eBay also launch.
- In 2019, 5G networking is introduced, and today over 5 Billion people use the Internet

Internet Protocol Suite

APPLICATION

HTTP SMTP FTP

TRANSPORT

TCP UDP

NETWORK

IP

DATA LINK

PHYSICAL DEVICES

IP ADDRESS



NETWORK

192.168.0.1

IP



TCP



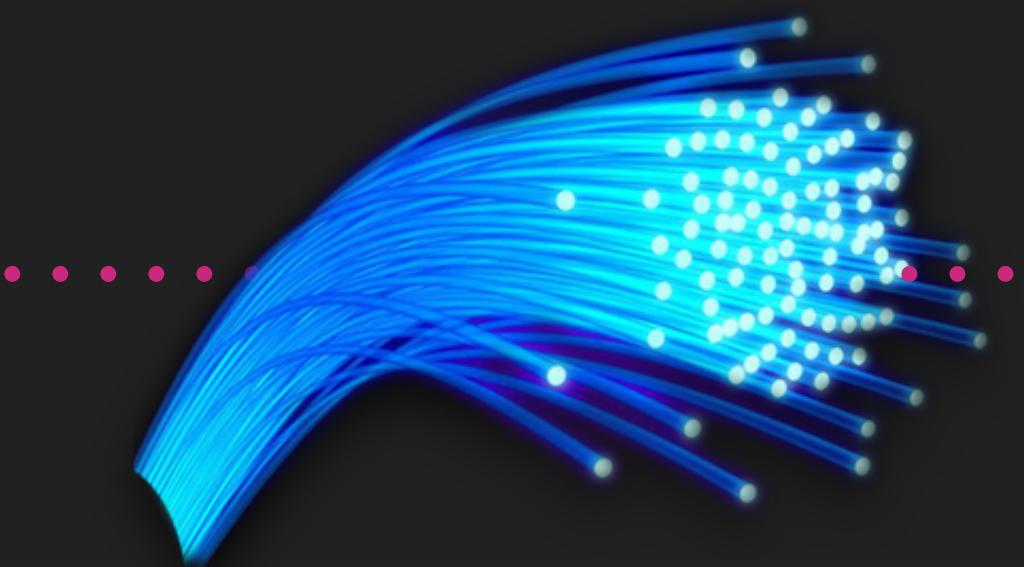
TRANSPORT

TCP

UDP



PACKETS



DATA LINK



PHYSICAL DEVICES



APPLICATION

HTTP SMTP FTP

TRANSPORT

TCP UDP

NETWORK

IP

DATA LINK

PHYSICAL DEVICES

PACKETS ARE BUT BACK TOGETHER BY THE BROWSER,
BY THE RECEIVING COMPUTER

INTERNET



=

HARDWARE

INTERNET



!=



Does not equal (!=)

SOFTWARE



YOU ACCESS WEBPAGES WITH HTTP

HTTP

HYPertext Transfer Protocol



URL

UNIFORM RESOURCE LOCATOR

https://en.wikipedia.org/wiki/Main_Page



The screenshot shows the English Wikipedia Main Page. At the top, there is a navigation bar with links for "Main Page", "Talk", "Read", "View source", "View history", and a search bar. A user message indicates "Not logged in". Below the header, a large banner reads "Welcome to Wikipedia, the free encyclopedia that anyone can edit." It also mentions "6,546,045 articles in English". On the left sidebar, there is a "WIKIPEDIA" logo and a list of links including "Main page", "Contents", "Current events", "Random article", "About Wikipedia", "Contact us", "Donate", "Contribute", "Help", "Learn to edit", "Community portal", "Recent changes", "Upload file", and "Tools". In the center, there is a section titled "From today's featured article" featuring a historical illustration of the Battle of Halidon Hill and a detailed description of the battle. To the right, there is a "In the news" section with a link to "Webb's First Deep Field" and an image of a star cluster.

Not logged in [Talk](#) [Contributions](#) [Create account](#) [Log in](#)

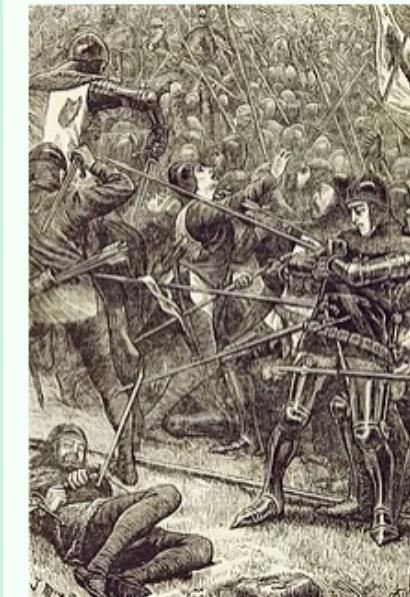
Main Page [Talk](#) Read [View source](#) [View history](#) Search Wikipedia

WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Current events
Random article
About Wikipedia
Contact us
Donate
Contribute
Help
Learn to edit
Community portal
Recent changes
Upload file
Tools

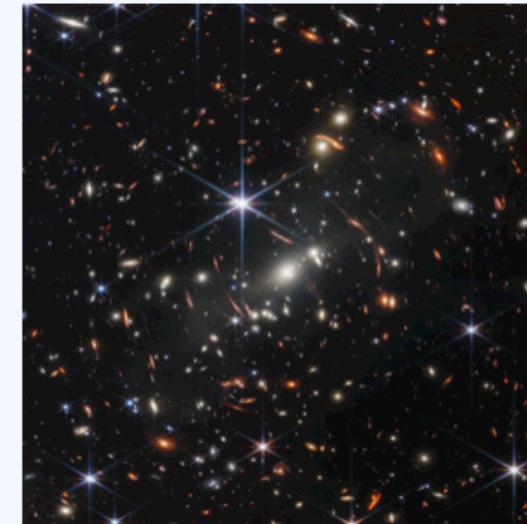
Welcome to Wikipedia,
the free encyclopedia that anyone can edit.
6,546,045 articles in English

From today's featured article

The **Battle of Halidon Hill** took place on 19 July 1333 when a Scottish army under **Sir Archibald Douglas** attacked an English army commanded by King **Edward III** (reigned 1327 to 1377) and was heavily defeated. In early 1333 Edward invaded Scotland and laid **siege** to the strategically important border town of **Berwick-upon-Tweed**. A large Scottish army advanced to relieve the town. Knowing Berwick was on the verge of surrender and aware

In the news

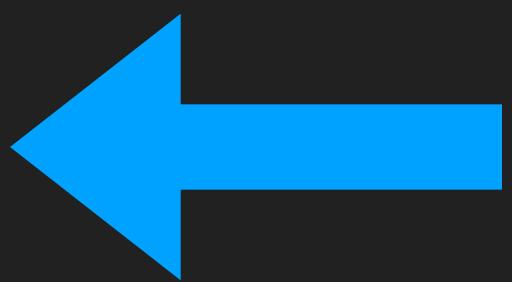
- **NASA** releases **the first operational image** (shown) taken by the James Webb Space Telescope.
- **Protesters storm** the President's House in **Colombo**, Sri Lanka, forcing President **Gotabaya Rajapaksa** to flee and Prime Minister **Ranil Wickremesinghe** to agree to resign.

Webb's First Deep Field



BROWSER

We access the URL in the browser



CLIENT

THE BROWSER IS THE CLIENT

SERVER



ON THE OTHER END OF THE URL, THERE IS ANOTHER COMPUTER
CALLED A SERVER

REQUEST



THE CLIENT MAKES THE REQUEST



GET

<https://example.com>

SERIALIZED REQUEST

.....

200K

Web page data ...

RESPONSE

HTTP MESSAGES

GET

<https://example.com>

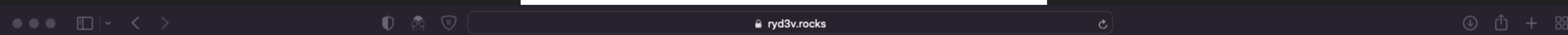
THE RESPONSE IS CALLED A HTTP MESSAGE

A horizontal row of 20 small red circles, each containing a white number from 1 to 20.

200K

Web page data ...

DOMAIN NAME



RYDEV

HOME BLOG ABOUT CONTACT

Software Engineer

Teaching programming, development, React / Next.js



Website Design & Development

I love to design and build beautiful responsive websites. Utilizing technologies like React, TypeScript, and Next.js

Software Development

I have extensive experience with JavaScript, TypeScript, HTML/CSS, Node.js, React, SQL, Redis, and Mongo. Python, C++ and C#

REGISTRAR

You can get a domain name from a registrar

Name.com

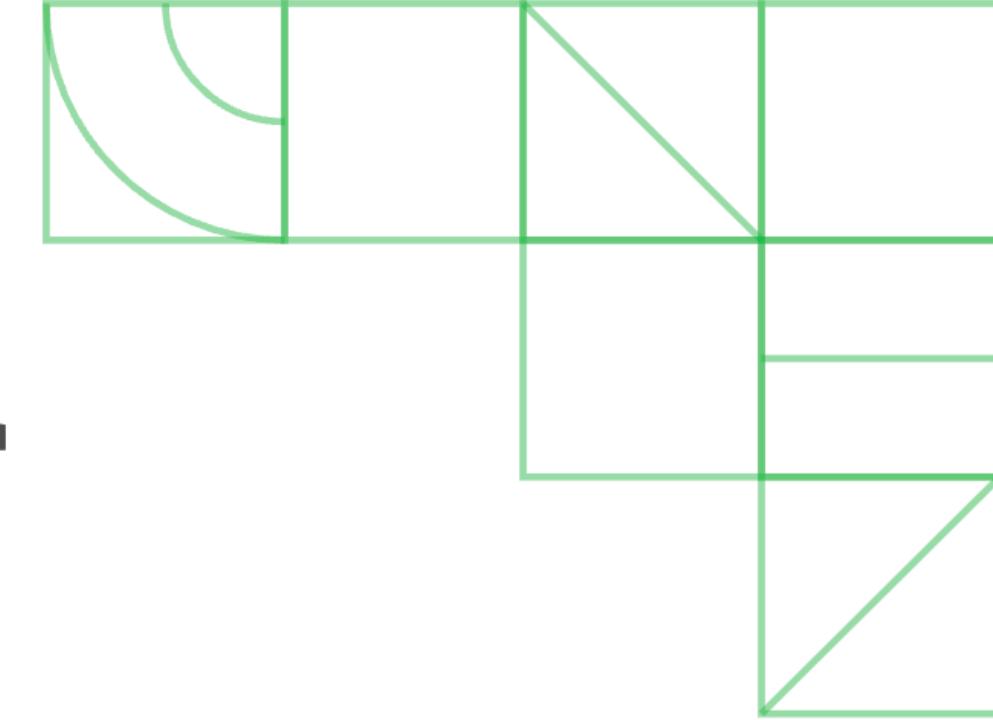
Domains  Products  Support 

My Products My Domains

LOG IN



15% off for all new customers. Use code **SAVE15**



Easy solutions for demanding projects

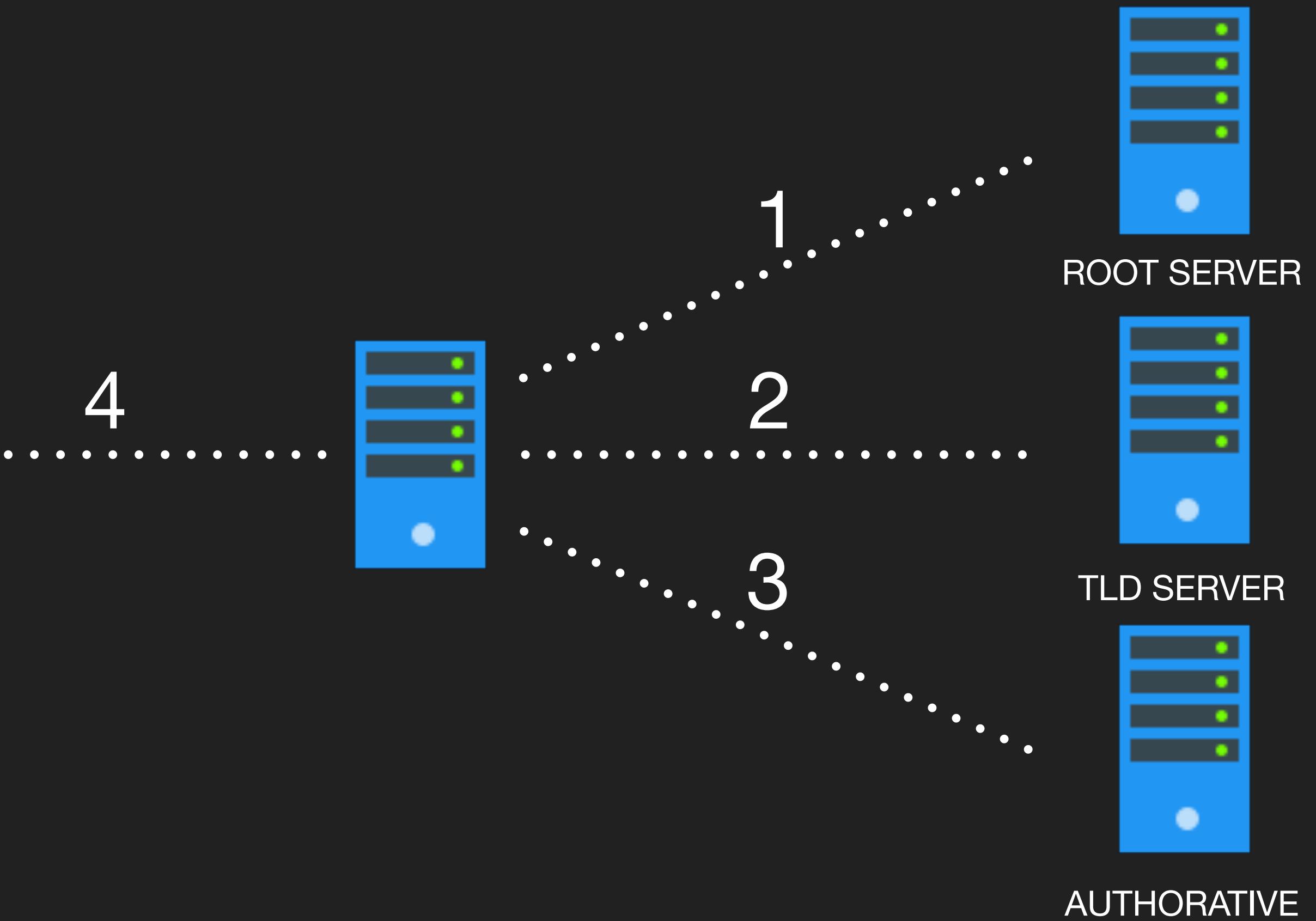
No matter what you're working on, we make it simple to find the right domain and connect it to your favorite products.

Search domain names



[Bulk Search](#)

DNS



When you navigate to a URL in the browser It gets routed through the domain name system, It maps the domain name to a IP

DNS IS BASICALLY LIKE THE PHONE BOOK OF THE INTERNET

HTML



Browsers can read a formatted text called HTML



Thomas H. Cormen
Emeritus Professor
Department of Computer Science

I retired on January 1, 2022. I am no longer taking any new students or interns at any level.

Update June 2022: I am a Democratic candidate for the New Hampshire House of Representatives running in Lebanon Ward 3 (Grafton County District 15).

Ph.D., [Massachusetts Institute of Technology](#), 1992.

- [Papers](#)
- [FG](#)
- [Other software](#)
- [Vita](#)

I taught my final course in Fall 2019. You can view a [video of my last lecture](#), which was not about computer science.

Khan Academy now carries [algorithms tutorials](#) for which [Devin Balkcom](#) and I produced content.

Are you looking for solutions to exercises and problems in *Introduction to Algorithms*?

If you are, then see the [frequently asked question and answer](#) below.

If you request solutions from me, I will not respond.

From July 2004 through June 2008, I was the director of the [Dartmouth Institute for Writing and Rhetoric](#).

I occasionally taught a graduate Computer Science course on how to write papers and how to give talks. I publish a [list of usage rules](#) required my students to observe.

In 2015, PRI's "The World" ran a [story on mentoring women in computer science](#) in which a couple of my students and I were interviewed.

I was interviewed for the *Command Line Heroes* podcast "[Learning the BASICS](#)."

You can also hear me spout off in "[Philosophical Trials #7](#)."

I talked about writing *Introduction to Algorithms* in [an episode of "Frank Stajano Explains"](#).

And an [interview with a Brazilian vlogger](#).

Graduate Student Alumni

- [Alex Colvin](#), Ph.D. 1999
- [Peter C. Johnson](#)
- [Priya Natarajan](#), Ph.D. 2011 [[Photo](#) of Priya and me at 2012 Dartmouth graduation]
- Geeta Chaudhry Petrovic, Ph.D. 2004 [[Photo](#) of Geeta and me at 2004 Dartmouth graduation]
- [Elena Riccio Strange](#) (formerly Elena Riccio Davidson), Ph.D. 2006
- [Len Wisniewski](#), Ph.D. 1996
- [Melissa Hirschl Chawla](#), M.S. 1997
- [Michael Ringenburg](#), M.S. 2001
- Georgi Vassilev, M.S. 1994

WHY IS THIS IMPORTANT?

- We will be creating the webpage data that is sent over the internet
- The data sent has a particular structure, hypertext markup language (HTML)
- We will learn how to write and create this data that the browser understands
- As a developer, you should have some general idea how the internet works

YOUR PROJECT

PROJECT EXAMPLE

When you finish this course, I want you to feel comfortable enough with the basics, to be able to make a website or blog for yourself, your friends and family.

Let's take some time now to make sure we have our environment all setup, and look at some example webpages.

For advanced students, or if you already have experience in this area, now would be a great time to brainstorm some ideas for your own project.

Projects can include a personal blog, something like,

<https://www.cs.dartmouth.edu/~thc/>

This example is by Professor Thomas H. Carmen, co-author of introduction to algorithms



Thomas H. Cormen
Emeritus Professor
Department of Computer Science

I retired on January 1, 2022. I am no longer taking any new students or interns at any level.

Update June 2022: I am a Democratic candidate for the New Hampshire House of Representatives, running in Lebanon Ward 3 (Grafton County District 15).

Ph.D., [Massachusetts Institute of Technology](#), 1992.

- [Papers](#)
- [FG](#)
- [Other software](#)
- [Vita](#)

I taught my final course in Fall 2019. You can view a [video of my last lecture](#), which was not about computer science.

Khan Academy now carries [algorithms tutorials](#) for which Devin Balkcom and I produced content.

Are you looking for solutions to exercises and problems in *Introduction to Algorithms*?

If you are, then see the [frequently asked question and answer](#) below.

If you request solutions from me, I will not respond.

From July 2004 through June 2008, I was the director of the [Dartmouth Institute for Writing and Rhetoric](#).

I occasionally taught a graduate Computer Science course on how to write papers and how to give talks. I publish a [list of usage rules](#) that I required my students to observe.

In 2015, PRI's "The World" ran a [story on mentoring women in computer science](#) in which a couple of my students and I were interviewed.

I was interviewed for the *Command Line Heroes* podcast "[Learning the BASICS](#)."
You can also hear me spout off in "[Philosophical Trials #7](#)."
I talked about writing *Introduction to Algorithms* in [an episode of "Frank Stajano Explains."](#)
And an [interview with a Brazilian vlogger](#).

As you can see this website is very basic, just HTML with no formatting at all, almost nostalgic of the websites of the past

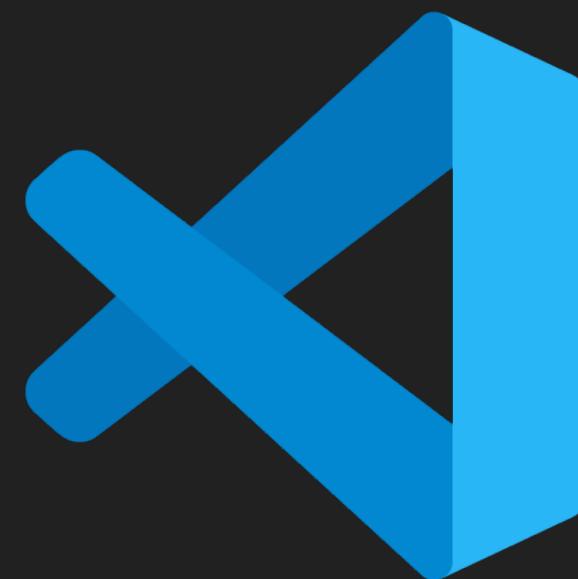
The background features a series of overlapping, wavy layers in various shades of purple, creating a sense of depth and motion.

WHAT DO YOU WANT TO
MAKE?

CLASS SETUP

For the beginners in the course, take some time now to setup all your online accounts, and configure your coding environment.

If you need any extra help, we can go through it step by step together



Q&A PERIOD